UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

Forest Insect & Disease Management
P.O. Box 5895, Asheville, NC 28803

REPLY TO: 5230 Evaluation
Report No. 77-1-18

August 11, 1977

SUBJECT: Service Trip - Francis Marion Seed Orchard

TO: Forest Supervisor, Francis Marion & Sumter NF

A service trip was conducted on the Francis Marion Seed Orchard April 25-28, 1977 by Larry R. Barber, Neal Overgaard, and James Smith, Entomologists, FIDM, S&PF. Also present to give technical advise were John W. Barry, Pilot Project Specialist, MAG, Davis, California; and Connie Gardner with Chemagro, Kansas City, Missouri. The purpose of the trip was to evaluate spray coverage with the orchard's Rotomist (air blast - low volume) sprayer (Figs. 1 and 2).

METHODS

A spray deposit analysis was made to determine if spray coverage, which is essential for maximum insect control, was satisfactory. Spray cards made from Kromekote® paper were affixed to 12-ounce soft drink cans which were hung from branches in the upper and lower crown of three orchard trees (Fig. 3).

Three separate trial spray runs were made spraying a solution containing 2 pints Rhodamine dye and one pint of sticker in 100 gallons of water (Table 1). Because of the volume (GPM) and spray angle characteristics for D3-45 disk and core nozzles were known, they were used for the first and second spray test. The normal orchard spray nozzle, i.e., D5-56 was used in the third test. Only one side of each tree was sprayed in the first run while in runs 2 and 3 both sides were sprayed.

Using methods described in Appendix 1, field estimations of spray droplet size (VMD) volume median diameter, were calculated for selected spray cards in each test run.

RESULTS AND DISCUSSION

During the first run only one side of the trees were sprayed. Coverage was not satisfactory (Fig. 4). For the second run, both sides were sprayed. Coverage was much better but the total spray residue appeared to be insufficient. A third and final application using standard orchard spray nozzles and spraying both sides of each tree showed coverage to be satisfactory (Fig. 5).

The sprayer as adjusted for the third run operated adequately, however, the 40-foot trees were at the upper height limit for this sprayer to deliver pesticides satisfactorily (Appendix 2). Spray coverage in the coming years as the trees grow taller will not be as good. Consideration should be given to either changing to a more powerful sprayer or to a systemic insecticide, i.e., Furadan 10 G. In addition, when orchard personnel apply a pesticide to both crown faces they often must either subject themselves to toxic spray drift or spray one side and return at a later date when the wind direction is more favorable. The preferred method would be to treat both crown faces the same day. This can be done safely with an airblast orchard sprayer similar to the one in use on the Beech Creek Seed Orchard.

Table 1 shows the summary of the test parameters and results of the three tests. Ideally, all 360° of the entire upper crown are sprayed. This is, however, recognized as impractical because of restraints, e.g., manpower, equipment, tree spacing, and time. Based on Jack Barry's findings (Appendix 2), about 75 percent of the surface area of the tree can be sprayed with the Rotomist. Mr. Barry suggests consideration be given to investigating aerial application of pesticides. Either aerial application or more powerful ground equipment will be needed in the future if orchard personnel are to continue using nonsystemic insecticides.

The orchard has been applying a solution containing 6 pints of Guthion 2S per 100 gallons of water. The Guthion 2S label (Appendix 3) directions are to use 30 pints of Guthion per 100 gallons of water with a low volume sprayer (Airblast-Rotomist) while applying 1-2 gallons of the mix per tree. Data from four Federal orchards including the Francis Marion indicate insect control may be achieved using less than the recommended label rate. Researchers from the U. S. Forest Service, Southeastern Forest Experiment Station also feel insect control may be achieved using less than the label recommended rate. Analysis of seed from the Francis Marion also tends to support this position even though the differences between the control and check were not statistically significant (Table 3).

Neal Overgaard determined the amount of spray necessary to thoroughly cover (drench) all foliage on a 29-foot loblolly pine was about 4 gallons (Table 4). In spray test three, adequate coverage was obtained in the upper crown of 35-40-foot trees using one gallon of spray mix per side (2 gallons total). More spray material (active ingredient) per tree will be needed as they become larger. This may be accomplished by decreasing the tractor speed, thus allowing more time to spray each tree. Another alternative is to increase the spray mix concentration.

Droplet size (VMD) was 230 microns for each test (Table 1). Considering the variety of pests found on the orchard, VMD's in the range of 250 micron size are deemed suitable.

RECOMMENDATIONS

1. Consider using Furadan 10 G for control of orchard insect pests as soon as possible.

2. Spray both sides of each cone bearing tree.

3. Concentrate on spraying the upper two-thirds of the crown.

4. Consider replacing the Rotomist sprayer with an orchard sprayer similar to that in use on the Beech Creek Seed orchard.

5. Use a spreader sticker.

6. Conduct another spray analysis before spraying begins in the spring of 1978.

7. Continue to mix the Guthion 2S concentrate at the rate of 6 pints in 100 gallons of water for the remainder of the 1977 spraying season.

8. Note recommendations in Appendix 2.

If there are any questions or comments concerning this report or its recommendations, please contact me.

Harold W. Flake

HAROLD W. FLAKE
Field Office Representative

Enclosures
cc: Lako

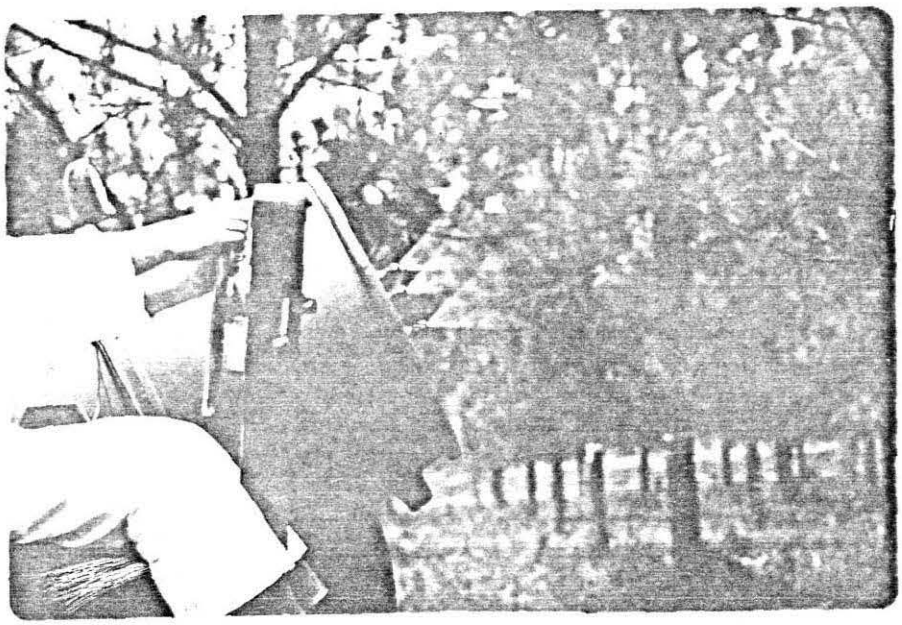


Figure 1. Rotomist sprayer used on Francis Marion Seed orchard.

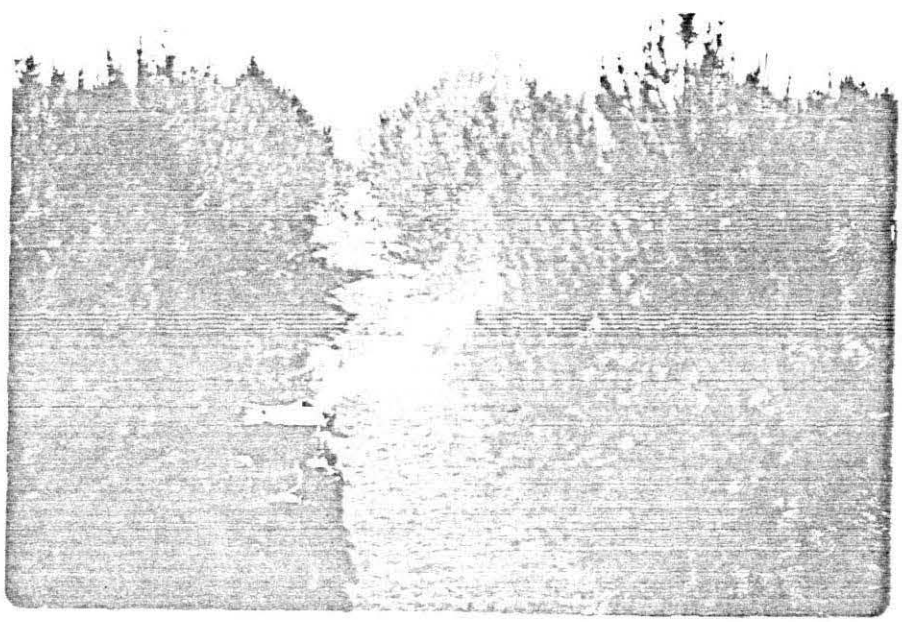


Figure 2. Rhodamine dye spray application to orchard trees using the Rotomist airblast sprayer.

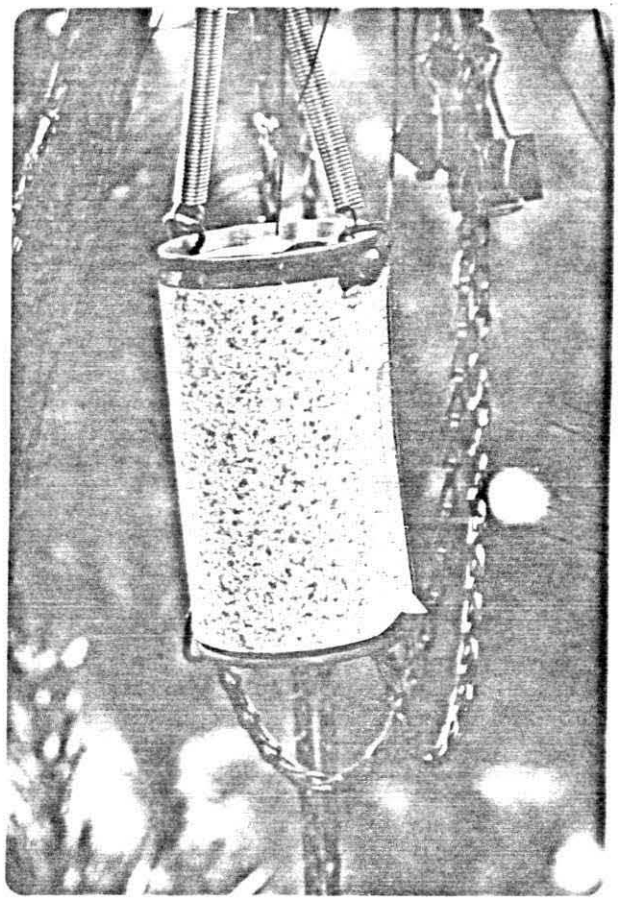


Figure 3. Spray cards made from Kromekote paper on soft drink cans used to indicate spray coverage.

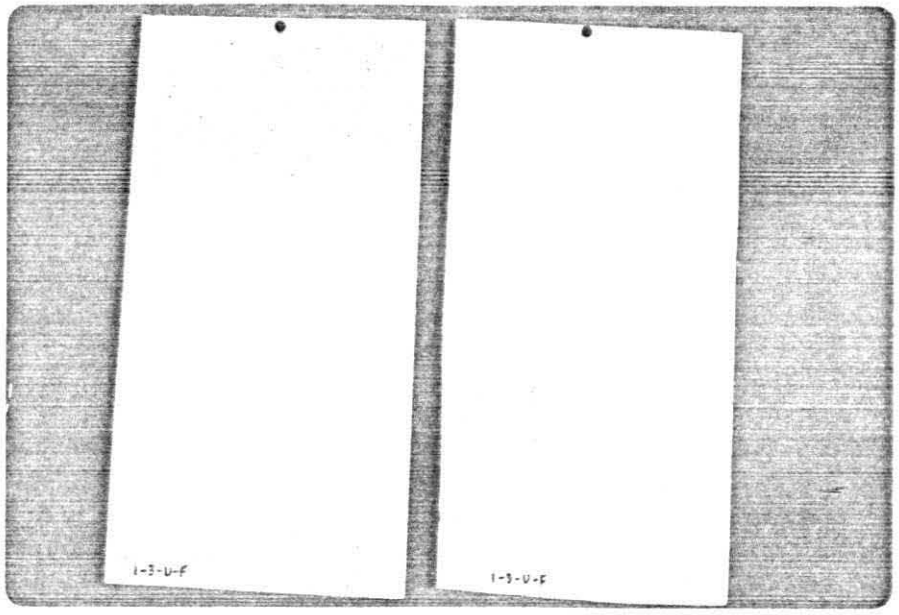


Figure 4. Spray coverage during first run showing light coverage on one side of the spray card. Only one side of each tree was sprayed.

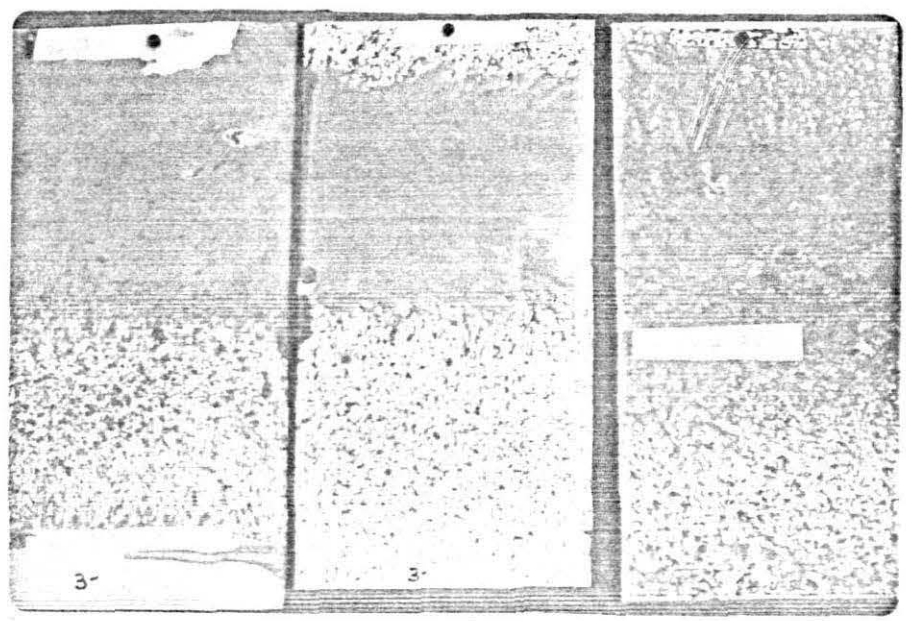


Figure 5. Spray coverage during third run showing satisfactory coverage. Both sides of each tree were sprayed.

Table 1. Summary of test parameters, USFS Francis Marion Seed Orchard, South Carolina, April 1977

Parameters	Trials 1	2	3
Date	April 26, 1977	April 26, 1977	April 27, 1977
Sprayer	Rotomist 100G	Rotomist 100G	Rotomist 100G
Nozzle Type	Spraying Systems Hollow Cone	Spraying Systems Hollow Cone	Spraying Systems Hollow Cone
Nozzle Size	D-3-45	D-3-45	D-5-56
Nozzle (total number)	3	3	3
Pressure	200 PSI	200 PSI	200 PSI
Application (gallon per minute)	1.83	1.83	5.02
Application (gallon per tree)	.33	.66	1.83
Sides of Tree Sprayed	1	2	2
Dye	Calcozine Rhodamine BX liquid 1/2 pint/ 100 gallons	Same	Same, plus 1/2 pound Rhodamine B extra (DuPont)
Sticker	none	1 pint/100 gallons	1 pint/100 gallons
Droplet Size (VMD)	230 um	230 um	230 um
Coverage (% visual estimate)	30%	60%	75%

Table 2. Background information for the USFS, Francis Marion Seed Orchard, Moncks Corner, S. C., spray deposit evaluation, April 1977

Parameters	USFS Francis Mation National Forest
Row Spacing	30'
Tree Spacing	15'
Tree Species	Loblolly Pine
Tree Height (maximum)	40'
Trees/Acre	97
Sprayer Type	Rotomist 100G (air blast)
Sprayer Pressure	200 PSI
Application/Tree	2 gallons
Nozzle Size	D-5-56 (3 each)
Chemical	Guthion 2S
Concentration	6 pints/100 gallons water
Sides of Trees Sprayed	2[1/]
Applications per Year	4
Guthion per Tree	.03 lbs.
Total Guthion/Season (rate/tree X No. trees/acre X frequency of spraying)	11.64 lbs/Ac/Yr
Spray Concentration	.2%
Label Recommended Rate[2/]	1.0% solution or 30 pints/100 gallons

1/ Only one side was sprayed in 1976.
2/ Based upon label and type sprayer (low volume).

Table 3. Radiographic analysis of treated and untreated loblolly pine seed lots from the Francis Marion Seed Orchard, 1976.

Treatment	Total Seed	Full Seed %	Empty Seed %	Seedbud Damaged Seed %	Laspeyresia Damaged %
Guthion	3403	66.5	27.0	2.7	3.8
Check	2877	48.9	44.7	6.3	0.0

Table 4. Gallons of spray required per tree on seed orchard trees.

Tree Species	No. trees sprayed	Average tree hgt. (ft) (range)	High volume drench gal/tree (range) (6 pts/100 gals)	Low volume mist/blower gal/tree 30 pts/100 gal (5x)
loblolly	8	28.6 (25-34)	3.78 (2.52-7.98)	0.76 (3/4)
shortleaf	5	23.6 (21-24)	2.56 (2.10-3.15)	0.51 (1/2)
loblolly	10	20.2 (18-23)	1.70 (1.47-2.39)	0.34 (1/3)
shortleaf	5	15.2 (13-18)	0.97 (0.63-1.68)	0.19 (1/4)
		Merkel's Work		
longleaf		55'		2.00
slash		40'	8	

APPENDIX I

FIELD ESTIMATION OF VOLUME MEDIAN DIAMETER[1/]

The procedures outlined are for the field estimation of the volume median diameter (VMD) are based on the approach suggested by B. Maksymiuk (1964). Although Maksymiuk tested his approach using propeller-driven slow and medium speed aircraft and oil-based sprays, recent experience indicates the method is also adequate for the field estimation of VMD's for seed orchard equipment and sprays.

In the following discussion, it has been assumed that the "stain factor" has been measured prior to the trials. The stain factor is the relationship between the drop size before impaction on the sampling card and the size of the stain produced by the drop on the card. A typical relationship is given by the expression

$$DD = a + b\,(SD) + c\,(SD)^2$$

where

DD = drop diameter

SD = stain diameter

and a, b, and c are constants determined in the laboratory. In the above expression there is no specific provision for the spread of the stain as a function of time after the drop impacts. For some oil-based sprays and some types of sampling cards, the stain can continue to spread for hours after drop impact. When long periods of time are required for stabilization of stain diameters, the analysis of VMD (and perhaps drop density estimation) must either be delayed until stabilization occurs or the time after drop impact be included in the stain factor expression. Also, in the case of long stabilization times, cards may either have to be left on the sampling grid for longer times or special care taken to protect the cards during collection from the grid to prevent smudging.

The D-max method for estimating VMD is based on inspection of sampling cards for large diameter stains. In theory, use of the method requires selecting and measuring the largest stain on every card before selecting the five largest drops. In practice, the following procedure is recommended.

(1) Visually inspect the card and select the largest stain appearing on the card.

(2) Measure the stain diameter to the nearest 50 micrometers using the measuring magnifier graduated in 100 micrometer intervals.

1/ Dumbauld, R. K. and J. E. Rafferty. 1976. Field Manual for Characterizing Spray from Small Aircraft. USDA, Forest Service.

(3) If there are several stains nearly as large as the largest stain on the card, measure their diameters.

(4) Proceed to the next card and repeat the measurement procedure.

(5) Using the stain factor, compute the drop diameter for the largest stains on each card. A battery-operated pocket calculator is recommended for use in making this calculation.

(6) Select the five largest drop diameters from the tabulated values and enter their card numbers and diameters in the spaces provided on the form; enter the largest diameter at the top and the smallest diameter at the bottom. If two or more drops are the same size, they should still be counted as separate drops and listed sequentially in the "Five Largest Drops" table.

(7) The largest drop appearing in the "Five Largest Drops" table is used in the next step to estimate the VMD for the trial, providing that the difference in diameter between any two successively ordered drops does not exceed 32 micrometers. If a difference in diameter greater than 32 micrometers occurs between any of the drops, the drop just below the 32-micrometer gap is used in the next step.

(8) The VMD for the trial is estimated by dividing the drop selected in Step (7) by a factor of 2.2. Enter the VMD in the space provided.

(9) A VMD may be calculated either for individual cards or for one entire trial.

FIELD CHARACTERIZATION OF VOLUME MEDIAN DIAMETER (VMD)

Trial Number _____

Time/Date _____

Row/Line Number _____

Sprayer Type _____

Number of Nozzles _____

Nozzle Type (Cone & Disk) _____

Spray Material _____

Flow Rate _____

Miscellaneous _____

_____

_____

Stain Factor Constants a _____

b _____

c _____

Stain Factor Relationship:

$DD = a + b(SD) + c\ (SD)^2$

DD = Drop Diameter

SD = Stain Diameter

Largest Stains and Drops

Card Number	Stain Diameter	Drop Diameter DD = SD/2

Five Largest Drops

Card Number	Drop Diameter

VMD = DD/2.2

Rhodamine Stain Factor = 2

VMD = _____

APPENDIX 2

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

WO-FI&DM Methods Application Group
2810 Chiles Road, Davis, CA 95616

REPLY TO: 5200 Forest Insect and Disease Control

May 13, 1977

SUBJECT: Trip Report - John W. Barry, April 25-28, 1977, Southeastern Area

TO: Group Leader, MAG

PURPOSE OF TRIP

Trip was made in response to a request from SA to visit southern pine seed orchards and identify problems associated with control of insects causing damage to pine flowers, conelets, and cones.

PLACE AND DATES

Seed orchards located at USFS Francis Marion National Forest and International Paper Comapny, Georgetown, South Carolina, April 25-28, 1977.

PERSONS CONTACTED

Larry Barber	- FI&DM Asheville, North Carolina
Connie Gardner	- CHEMAGRO, Kansas City, Kansas
Neal Overgaard	- FI&DM, Alexandria, Louisiana
Jim Smith	- FI&DM, Alexandria, Louisiana
Tom Gentry	- FI&DM, Asheville, North Carolina
Lee Eaton	- FI&DM, Asheville, North Carolina
O.D. Smith	- Timber Management, Francis Marion-Sumter National Forest, South Carolina
Al McDonald	- Timber Management, Francis Marion-Sumter National Forest, South Carolina
Ollie Buckles	- Manager, Francis Marion National Forest Seed Orchard
Roy Hutton	- Manager, Georgetown Nursery, International Paper Co.

DISCUSSION

Control of flower, conelet, and cone insects in southern pine seed orchards was inadequate at all orchards during 1976. Over the years, control has been erratic and unpredictable, succesful and unsuccessful. International Paper Comapny indicated that insect control varies from 0% to 70%. Control at Francis Marion was equally variable and unpredictable.

Those individuals listed above met at the USFS Francis Marion Seed Orchard to discuss problems of inadequate control, to observe spray application procedures, and to discuss immediate and long-term methods to improve control. Control problems were categorized as follows:

A. Insecticide handling & formulation
B. Insect biology
C. Weather
D. Timing of application
E. Application method
F. Application rate

Table 1 is a summary comparing various aspects of the two nurseries.

Two formulations of Guthion were used during 1976 - 2L and 2S. The 2L formulation crystalizes at temperatures below 55° F. There is no crystalization problem, however, with the 2S formulation. Crystalization could have been a problem at orchards which used 2L. Francis Marion Seed Orchard used the 2S formulation. There is no way of determining whether crystralization was a problem nor can it be determined whether insect biology, weather, or timing of application were problems. On the basis of discussion with orchard and FI&DM personnel, inadequate spray coverage of the target is suspected as being the major problem.

Three spray runs (trials) were conducted at the Francis Marion National Forest Seed Orchard for the purpose of observing:

A. Field methods of orchard spraying with the Rotomist
B. Equipment performance
C. Spray mixing
D. Spray coverage at target
E. Nature of the target

Performance of the Rotomist was normal for mist-type blowers. Spray nozzles consist of Spraying Systems, Incorporated hollow cone "D" series tips. Spray tips, used by the Francis Marion, are D-5 orifice with a 56 core. Both affect the flow rate and angle of the spray as it leaves the nozzle tip. The D-5-56 has a 34° spray angle and an associated flow rate of 1.69 gpm.

Table 2 presents the summary of the test parameters and results. Water dyed with Rhodamine was used in each trial and a sticker was added to Trial 2 and 3. Only the procedures (nozzle size and treatment of both sides of the trees) used in Trial 3 showed adequate coverage of the spray (75% coverage) based upon spray droplets on Kromekote paper samples, cones and foliage.

Insecticide mixing and equipment performance seemed to be adequate. The Rotomist Md. 100G is adequate for trees up to 40' in height.

The spray target is complex. Destructive insects occur on flowers, conelets, and cones. Several species are involved. Those which bore into the cones would be very difficult to reach with the spray.

To insure maximum coverage of these targets, both sides of the tree must be sprayed. Ideally, however, the entire 360° circumference of the tree should be sprayed. This is recognized as impractical due to time, manpower, and lack of access to all sides of the tree. Based upon the results of this field evaluation, about 75% of the surface area of the tree can be sprayed with the Rotomist. It is not know if this is adequate for the desired level of control.

This suggests that aerial application would provide for more adequate coverage of the target. The arrangement of the tree branches subjects the cones, foliage, etc. to sunlight from above. For this reason, all cones have an open space directly above. This creates an open field to any spray delivered from an aerial source. It seems reasonable to use the force of gravity to deliver the spray to the target in lieu of ground blast equipment which must force the spray through vegetative mass shielding the targets in the upper part of the tree.

Forty feet seems to be the maximum height for the Rotomist 100G. As the trees reach greater height, more powerful equipment will be required. Tree height is not an influencing factor in aerial application.

The Francis Marion SO is spraying only a 0.05% concentration of Guthion with the low volume (Rotomist) sprayer. A 1% solution or 30 pints per 100 gallons of water is recommended.

The concentration for high volume hydraulic sprayers should be 0.2% which is the actual practice at International Paper Company, Georgetown.

Continual application of a single pesticide year after year should be evaluated in terms of insect resistence. International Paper Company indicated that they have been applying Guthion for seed orchard tree protection for 12 years. Assuming 5 applications of Guthion concentrate (A.I.) per year at an application rate of 2.5 gallons per acre, a total of 12.5 gallons/acre would be applied per year, or a total of 150 gallons per acre over 12 years.

RECOMMENDATIONS

1. Conduct an administrative study or pilot project to evaluate the economics, effectiveness, and operational aspects of aerial application of insecticides by both small helicopter and small fixed-wing to seed orchards. Consideration should be given to a joint effort with USFS Research.

2. Guthion formulation 2S should be used in lieu of 2L. The latter is subject to crystalization below 55° F.

3. When applying Guthion 2S with the Rotomist, a concentration of 1% Guthion should be used (30 pints/100 gallons). Both sides of the tree should be sprayed.

4. The VMD of the spray should be around 250-300 µm.

5. A sticker should be used with the formulation.

6. Spray should be concentrated in the upper 2/3 of the tree with emphasis on the upper 1/3 where most cones are located.

7. Consideration should be given to conducting a workshop on the technical aspects of seed orchard protection. The objectives of the workshop would be to determine the state of the arts, define problems, identify research needs, survey ground spray equipment and publish a handbook on seed orchard protection.

8. A standardized pesticide application report form should be developed and completed after each day of spraying including items listed on Table 3.

John W. Barry

JOHN W. BARRY
Pilot Project Specialist

Enclosures

Table 1. - Comparison of seed orchards, Francis Marion National Forest and International Paper Company, South Carolina, April 1977.

PARAMETERS	SEED ORCHARD	
	USFS Francis Marion National Forest	Interhational Paper Co. Georgetown
Row Spacing	30'	30'
Tree Spacing	15'	15' to 30'
Tree Species	Loblolly Pine	Loblolly Pine
Tree Height	40'	55'
Trees/Acre	50	37
Sprayer Type	Rotomist 100G	Hydraulic
Application/Tree	2 gallons	9 gallons
Chemical	Guthion	Guthion
Concentration	6 pints/100 gallons water	6 pints/100 gallons water
Sides of Trees Sprayed	2 1/	2
Guthion per Tree	0.5 ounces	2.16 ounces
Total Guthion/Season (rate/tree X no. trees/ acre X frequencty of spraying)	125 ounces	399.6 ounces
Seed Value	$450/pound	$900/pound
Actual Rate (concentration)	.05%	.2%
Recommended rate 2/	1.0% solution or 30 pints/100 gallons	.2% solution or 6 pints/100 gallons

1/ Only 1 side was sprayed in 1976. This calculated to only 0.25 ounces of active Guthion/tree.

2/ Based upon label and type sprayer.

Table 2 - Summary of Test Parameters, USFS Francis Marion Seed Orchard, South Carolina, April 1977.

Parameters	Trials 1	2	3
Date	April 26, 1977	April 26, 1977	April 27, 1977
Sprayer	Rotomist 100G	Rotomist 100G	Rotomist 100G
Nozzle Type	Spraying systems Hollow Cone	Spraying systems Hollow Cone	Spraying systems Hollow Cone
Nozzle Size	D-3-45	D-3-45	D-5-56
Nozzle (total number)	3	3	3
Pressure	200 psi	200 psi	200 psi
Application (gallon per minute)	1.83	1.83	5.02
Application (gallon per tree)	.33	.66	1.83
Sides of tree sprayed	1	2	2
Dye	Calcozine Rhodamine BX liquid 1/2 pint/ 100 gallons	Same	Same, plus 1/2 pound Rhodamine B extra (DuPont)
Sticker	none	1 pint/100 gallon	1 pint/100 gallon
Droplet Size (VMD)	230 µm	230 µm	230 µm
Sampler			
Kromekote paper (on soft drink can)	X	X	X
Conelet	X	X	X
Cone	X	X	X
Needles	X	X	X
Coverage (% visual estimate)	30%	60%	75%

Table 3 - Items to include in a pesticide application report for seed orchard spraying.

Name of Applicator

Spray Date

Spray Time

Temperature

Relative Humidity

Wind Speed

Wind Direction

Cloud Cover

(Above taken at start and end of spraying)

Insecticide

Concentration Percent and Volume to Volume Mixture

Hydraulic Pressure

Application Rate

Volume Applied Per Tree

Sprayer Type/Model

Spray Ground Speed

Nozzle Type

Nozzle Size

Sticker Used

Dye Used

Sides of Tree Sprayed

Rows Treated

Remarks

APPENDIX 3

C-483216

Base Reg. (2590)

U.S. LABEL

Revision to Issue: To add ULV use on apples, crab apples and quinces in the Northwestern States; revise "Conditions of Sale".

Date of Draft: 1/12/77 (S)
Supersedes Draft Dated: 10/1/76
and Pre-Reg. Draft Dated: 2/4/76

EPA Reg. No. 3125-123-ZC

(R)
GUTHION 2S

EMULSIFIABLE INSECTICIDE

FOR EFFECTIVE ECONOMICAL INSECT CONTROL

Contains 2 lbs. O,O-Dimethyl S-[(4-oxo-1,2,3-benzotriazin-3(4H)-yl)methyl] phosphorodithioate per gallon.

NET CONTENTS _____ GALLONS

POISON

DANGER

KEEP OUT OF REACH OF CHILDREN

(See rear panel for antidote and danger statements)

ACTIVE INGREDIENTS:	
O,O-Dimethyl S-[(4-oxo-1,2,3-benzotriazin-3(4H)-yl)methyl] phosphorodithioate	22%
Aromatic Petroleum Distillate ...	52%
INERT INGREDIENTS:	26%
	100%

EPA Reg. No. 3125-123-ZC

DO NOT STORE BELOW 25° F. PROTECT FROM HEAT

KEEP AWAY FROM OPEN FLAME

DO NOT HEAT

STOP - READ THE LABEL BEFORE USE

CHEMAGRO AGRICULTURAL DIVISION
MOBAY CHEMICAL CORPORATION
Box 4913, Kansas City, Mo. 64120

Note: Underlined letters in chemical nomenclature should be italicized when printed, not underlined.

DIRECTIONS FOR USE

IMPORTANT: Read these entire Directions and Conditions of Sale before using GUTHION 2S emulsifiable insecticide.

CONDITIONS OF SALE: THE DIRECTIONS ON THIS LABEL WERE DETERMINED THROUGH RESEARCH TO BE THE DIRECTIONS FOR CORRECT USE OF THIS PRODUCT. THIS PRODUCT HAS BEEN TESTED FOR A RANGE OF WEATHER CONDITIONS SIMILAR TO THOSE WEATHER CONDITIONS THAT ARE ORDINARY AND CUSTOMARY IN THE GEOGRAPHIC AREA WHERE THE PRODUCT IS USED. INSUFFICIENT CONTROL OF PESTS MAY RESULT FROM THE OCCURRENCE OF EXTRAORDINARY OR UNUSUAL WEATHER, OR FROM FAILURE TO FOLLOW LABEL DIRECTIONS. IN ADDITION, FAILURE TO FOLLOW LABEL DIRECTIONS MAY CAUSE INJURY TO THE CROP TO WHICH THE PRODUCT IS APPLIED, OTHER CROPS, ANIMALS, MAN, OR THE ENVIRONMENT. CHEMAGRO AND THE SELLER OFFER, AND THE BUYER ACCEPTS AND USES, THIS PRODUCT SUBJECT TO THE CONDITIONS THAT EXTRAORDINARY OR UNUSUAL WEATHER OR FAILURE TO FOLLOW LABEL DIRECTIONS ARE BEYOND THE CONTROL OF CHEMAGRO AND ARE, THEREFORE, THE RESPONSIBILITY OF THE BUYER.

MIXING: GUTHION 2S emulsifiable insecticide forms an emulsion when diluted with water and is suitable for use in all power-operated ground sprayers and aircraft sprayers. To mix with water, pour the required amount of GUTHION 2S into full amount of water and then agitate. If cold water is to be used and nozzle or screen plugging is experienced, 16 mesh slotted screens (from Spraying Systems Co.) are recommended.

DOSAGE: Use specified dosage of GUTHION 2S in the amount of water necessary to give complete coverage of foliage. The type of equipment used will determine the concentration required.

SPRAYING: Work to windward. Protect sprayer operators from drift or mist. When low volumes of spray are applied, complete coverage and thorough application are essential for most effective results. Schedule applications in accordance with local conditions. Consult your State Agricultural Experiment Station or Extension Service for specific use information in your area.

RECOMMENDED APPLICATIONS

CROP	INSECT	Pints GUTHION 2S	REMARKS
FIELD CROPS			Apply specified dosage per acre using a minimum of 10 gallons of water per acre when applying with ground equipment, and a minimum of 5 gallons per acre for aerial applications for alfalfa weevils and at least 1 gallon per acre for the other insects listed. It may be necessary to use 20 to 25 gallons of water per acre on heavy growth for control of alfalfa weevil or Egyptian alfalfa weevil with ground equipment. (REMARKS CONTINUED ON PAGE 3.)
Alfalfa Clover	Alfalfa weevil	1 to 3	
	Leafhoppers Mites	1 to 2	
	Egyptian alfalfa weevil	1-1/2 to 3	
	Alfalfa plant bug Fleahopper Grasshoppers Lygus bugs Spittlebug	2 to 3	

RECOMMENDED APPLICATIONS (Continued)

CROP	INSECT	Pints GUTHION 2S	REMARKS
FIELD CROPS (Cont.)			
Alfalfa Clover	Alfalfa weevil	1 to 3	Apply twice per cutting at the 1 pint rate at intervals of 10 to 11 days. Do not apply more than twice per cutting at the 1 pint rate. Apply only once per cutting at rates above 1 pint per acre. Do *not apply within 14 days of harvest* at the rates of 1 to 1-1/2 pints per acre or within 16 days at the rate of 2 pints per acre. Do not apply rates above 2 pints per acre within 21 days of harvest.
	Leafhoppers Mites	1 to 2	
	Egyptian alfalfa weevil	1-1/2 to 3	
	Alfalfa plant bug Fleahopper Grasshoppers Lygus bugs Spittlebug	2 to 3	
Cotton	Aphids Boll weevil Brown cotton leafworm Cotton fleahopper Cotton leafworm Lygus bugs Mites Thrips	1	Apply specified dosage per acre by air or ground equipment in sufficient water for complete coverage but not less than 1 gallon per acre. For early-season control of bollworm and pink bollworm use 2 to 3 pints and for mid-to-late season applications, use 3 to 4 pints. Repeat as necessary. Do not apply within 1 day of picking. Cotton receiving late-season applications should not be pastured and gin trash from this cotton should not be fed.
	Rapid plant bug Tarnished plant bug	1 to 2	
	Stink bug	2	
	Bollworm Pink bollworm	2 to 4	
Cotton[1] (Ultra Low Volume Spray)	Boll weevil	1/2 to 1	GUTHION 2S may be used undiluted in any ground or aerial spray equipment that has been adapted and calibrated for ultra-low volume spraying. Spray machines must be equipped with accepted low volume devices that will produce droplets within the range of 30 to 100 microns in size. ULV aerial applications should be made at altitudes of 10 to 20 feet. Repeat applications as necessary but not within 2 days of hand picking. Cotton may be machine harvested any time after application. Do not graze livestock in treated areas. Do not feed gin trash to livestock. Early and Mid-season Control: Apply specified dosage per acre in accordance with local recommendations.
		1	Diapause Weevil Control: The one pint per acre rate only is recommended for control of diapausing boll weevils. Schedule applications in accordance with local recommendations.

RECOMMENDED APPLICATIONS (Continued)

CROP	INSECT	Pints GUTHION 2S	REMARKS
FIELD CROPS (Cont.)			
Barley Oats Rye Wheat	Cereal leaf beetle	1-1/2 to 2	Apply specified dosage per acre by air or ground equipment in sufficient water for complete coverage but not less than 1 gallon per acre. Do not apply more than once per season. Do not harvest for food, feed, forage or graze within 30 days of treatment.
Soybeans	Aphids Bean leaf beetle Green cloverworm Leafhoppers Leaf miners Leaf rollers Stink bugs Velvet bean caterpillar	1-1/2 to 2	Apply specified dosage per acre by air or ground equipment in sufficient water to give complete coverage but not less than 1 gallon per acre. Repeat as necessary. Do not apply within 45 days of harvest. Do not graze or feed treated vines to livestock.
	Mexican bean beetle	2 to 3	
acco	Aphids Grasshoppers Tobacco hornworm Tobacco flea beetle	2 to 3	Apply specified dosage per acre by air or ground equipment in sufficient water for complete coverage but not less than 1 gallon per acre. Treat hornworms as soon as egg masses or worms are first found. Repeat as necessary but not within 6 days of harvest. Prime before treating.
	Tobacco budworm	3	
FRUIT			
Apples Crab apples Quinces (Washington, Oregon, Idaho, Utah, and Northern California)	Apple maggot Codling moth European apple sawfly Eye-spotted bud moth Fruit tree leaf roller Green fruitworm Orange tortrix Plum curculio Red-Banded leaf roller	2 to 4	Apply specified dosage per acre undiluted by helicopter or fixed wing aircraft using equipment capable of applying ultra-low-volume sprays(1). Use Beecomist nozzles with 20 micron sleeves. Do not apply more than 5 times per season nor within 7 days of harvest.

RECOMMENDED APPLICATIONS (Continued)

CROP	INSECT		Pints GUTHION 2S	REMARKS
FRUIT (Cont.)				Apply specified dosage in 100 gallons of water as a full coverage spray* using not more than 800 gallons of finished spray per acre. Repeat as necessary. Do not apply more than 8 times per season, within 21 days of harvest for apricots, nectarines, and peaches, nor within 15 days of harvest for plums and prunes. Apply the 1-1/2 pint rate for oriental fruit moth or peach twig borer on apricots, nectarines and peaches only before mid-season. For control of peach tree borer, apply 2 or 3 sprays to trunk from ground to scaffold limbs, timed with moth flight. For scale control, apply when crawlers are present. NOTE: It is suggested that when treating nectarines during bloom period, beekeepers should be warned well in advance to remove hives a safe distance from orchards to be treated.
Apricots Nectarines Peaches	Aphids Cottony peach scale European fruit lecanium scale Forbes scale Lesser peach tree borer Mites Peach tree borer	Platynota flavedana leaf roller Plum curculio Red-banded leaf roller San Jose scale Stink bug Tarnished plant bug Terrapin scale Walnut scale White peach scale	1 to 1-1/4	
	Oriental fruit moth Peach twig borer		1 to 1-1/2	
Nectarines	Thrips		1 to 1-1/4	
Plums Prunes	Aphids Eye-spotted bud moth Forbes scale Fruit tree leaf roller Lesser peach tree borer Mites Orange tortrix Peach tree borer	Peach twig borer Plum curculio Red-banded leaf roller San Jose scale Stink bug Tarnished plant bug Tussock moth	1 to 2	
	American plum borer		2	

RECOMMENDED APPLICATIONS (Continued)

CROP	INSECT	Pints GUTHION 2S	REMARKS
FRUIT (Cont.)			
Blackberries Boysenberries Loganberries Raspberries	Leafhoppers Leaf rollers	1	Apply specified dosage per acre to foliage using approximately 200 gallons of water for good coverage. Where ground conditions dictate an air application, use specified rate in a minimum of 1 gallon of water per acre. Repeat as necessary but not within 14 days of harvest.
	Leaf miners	1-1/4	
	Aphids	1-1/4 to 2	
	Obscure root weevil	2	
	Raspberry crown (root) borer	4 to 8	For control of root weevils and borers prior to harvest apply specified dosage per acre to lower portion of canes and to the soil beneath the plants, using approximately 200 gallons of water. Do not apply more than twice per season. Do not make applications within 3 days of harvest at rates up to 4 pints per acre. Rates above 4 pints per acre should be applied only before fruit set or after crop is harvested.
	Obscure root weevil	2	
Blueberries (Eastern & North Central States Only)	Blueberry maggot Fruitworms Lecanium Scale Plum curculio	2 to 3	Apply specified dosage per acre using approximately 200 gallons of water for good coverage. Where ground conditions dictate an air application, use specified rate in a minimum of 1 gallon of water per acre. Repeat as necessary but not more than 4 times per season nor within 3 days of harvest. If multiple late season applications of dust formulations containing GUTHION are to be made for blueberry maggot control, then do not make more than two applications of GUTHION 2S per season with the last spray no later than June 15.
Cranberries	Cranberry fruitworm Sparganothis sulfureana Tipworm	2 to 4	Apply specified dosage per acre using approximately 200 gallons of water for good coverage. Where ground conditions dictate an air application, use specified rate in a minimum of 1 gallon of water per acre. Repeat as necessary. Do not apply within 21 days of harvest.
	Fireworms	4	

RECOMMENDED APPLICATIONS (Continued)

CROP	INSECT	Pints GUTHION 2S	REMARKS
FRUIT (Cont.)			
Cherries	Eye-spotted bud moth Forbes scale Fruit flies Fruit tree leaf roller Lesser peach tree borer Mites Plum curculio San Jose scale	1 to 2	Apply specified dosage in 100 gallons of water as a full coverage spray* using not more than 800 gallons of finished spray per acre. Repeat as necessary. Do not apply more than 8 times per season nor within 15 days of harvest.
	Cherry leaf miner Mineola moth	1	
Citrus Fruits	Aphids Black scale Brown soft scale Chaff scale Citricola scale Citrus mealybug Citrus rust mite Citrus thrips Cottony-cushion scale European brown snail Florida red scale Fruit tree leaf rollers Fuller rose beetle Glover scale Orange tortrix Purple scale Snow scale Western tussock moth Whiteflies	1 to 1-1/2	Apply specified dosage in 100 gallons of water as a full coverage spray* using not more than 2000 gallons of finished spray per acre. A single application per year may be applied up to within 7 days of picking. Where 2 applications are required, the second spray should not be applied within 28 days of harvest. Do not apply more than twice per fruit year. Do not pick fruit or do other work involving contact with the tree, such as pruning, within 7 days of treatment.
	California red scale Texas citrus mite Yellow scale	1-1/2	
Grapes	Grape berry moth Grape cane girdlers Grape mealybug Leafhoppers Mites Red-banded leaf roller Thrips	1 to 2	Apply specified dosage in 100 gallons of water as a full coverage spray* using not more than 300 gallons of finished spray per acre. Repeat as necessary but not more than 3 times per season. Minimum dosage specified may be applied up to harvest. Higher rates up to 1-1/2 pints require a 10-day interval to harvest and above 1-1/2 pints a 28-day interval to harvest.

RECOMMENDED APPLICATIONS (Continued)

CROP	INSECT	Pints GUTHION 2S	REMARKS
FRUIT (Cont.)			
Straw-berries	Aphids Meadow spittlebug Oblique-banded leaf roller Omnivorous leaf tier Obscure root weevil Pea leaf weevil Small black (grass) weevil Strawberry leaf rollers Whitefly	2	Apply specified dosage in 200 gallons of water per acre as a full coverage spray*. Where ground conditions dictate an air application, use specified rate in a minimum of 1 gallon of water per acre. Repeat as necessary. Do not apply within 5 days of harvest.
NUTS			
Almonds	Peach twig borer	1-1/2 to 2	Apply specified dosage in 100 gallons of water as a full coverage spray* using not more than 500 gallons of finished spray per acre. Do not apply more than twice per season nor within 60 days of harvest. Allow 30 days between applications.
F ɔerts (Pacific Northwest Only)	Apple mealybug Filbert aphid Filbert leaf roller Filbertworm	1 to 3	Apply specified dosage in 100 gallons of water as a full coverage spray* using not more than 1000 gallons of finished spray per acre. Repeat as necessary. Do not apply within 30 days of harvest. Do not graze livestock in treated groves for 21 days after treatment.
Pecans	Aphids Fall webworm Hickory shuckworm Leaf miners May beetles Mites Pecan casebearer Southern green stink bug Spittlebug Twig girdlers Walnut caterpillar	1-1/2 to 2-1/4	Apply specified dosage in 100 gallons of water as a full coverage spray* using not more than 1800 gallons of finished spray per acre. Repeat as necessary. Do not apply after husks split. Where more than 22-1/2 pints of GUTHION 2S are applied per acre in a single application do not graze livestock in treated groves. Where 22-1/2 pints or less of GUTHION 2S are applied per acre livestock may be grazed in treated groves after a 21-day post-treatment interval.
Walnuts	Aphids Codling moth European red mite Filbertworm	1-1/2 to 3-3/4	Apply specified dosage in 100 gallons of water as a full coverage spray* using not more than 1100 gallons of finished spray per acre. Repeat as necessary. Do not apply after husks split. Do not graze livestock in treated groves for 21 days after treatment.

RECOMMENDED APPLICATIONS (Continued)

CROP	INSECT	Pints GUTHION 2S	REMARKS
VEGETABLES Artichokes	Plum moth	6	Apply specified dosage per acre by air or ground equipment in sufficient water for complete coverage but not less than 1 gallon per acre. Repeat as necessary. Do not apply within 30 days of harvest. Do not feed or ensile treated forage.
Beans (Snap & Dried)	Leaf rollers Mites	1 to 2	Apply specified dosage per acre by air or ground equipment in sufficient water for complete coverage but not less than 1 gallon per acre. Repeat as necessary. Do not apply to snap beans within 7 days of harvest nor to dry beans within 30 days of harvest. Do not exceed 4 applications on dry beans. Do not feed or ensile treated forage.
	Aphids Bean leaf beetle Green cloverworm Leafhoppers Leaf miners Stink Bugs Velvet bean caterpillar	1-1/2 to 2	
	Mexican bean beetle Spotted cucumber beetle Striped cucumber beetle Tarnished plant bug Western-striped cucumber beetle	2	
Broccoli Brussels Sprouts Cabbage Cauliflower	Aphids Cabbage looper Diamondback moth Imported cabbage-worm	2 to 3	Apply specified dosage per acre by air or ground equipment in sufficient water for complete coverage but not less than 1 gallon per acre. Repeat as necessary. Do not apply within 7 days of harvest for Brussels sprouts, 15 days of harvest for broccoli and cauliflower, nor within 21 days of harvest for cabbage.
	Cabbage maggot	1/2	Mix specified dosage in 50 gallons of water. Apply 4 to 6 ounces of this emulsion per plant immediately after transplanting.
	Cabbage maggot (Transplant Fields in California only)	3	Apply specified dosage in 300 to 400 gallons of water per acre as a soil drench in the rows when damage first appears. Additional applications may be necessary. Do not apply within 21 days of harvest.
	Cabbage maggot (Direct Seeded Fields in California only)	3	Apply specified dosage per acre in sufficient water for uniform distribution. Mix in the upper 2 inches of soil prior to seeding or spray in the seed row at planting time. Usually 2 to 3 additional sprays are necessary during the growing season depending upon time of year and maggot population. Do

RECOMMENDED APPLICATIONS (Continued)

CROP	INSECT	Pints GUTHION 2S	REMARKS
VEGETABLES (Cont.)			
Celery	Aphids Leaf miners Leafhoppers Spittlebugs Tarnished plant bug	2	Apply specified dosage in 100 gallons of water as a full coverage spray* using not more than 200 gallons of finished spray per acre. Repeat as necessary but not within 14 days of harvest.
Blackeyed peas (Southern peas, Crowder peas)	Corn earworm Cowpea curculio	3 to 4	Apply specified dosage per acre by air or ground equipment in sufficient water for complete coverage but not less than 1 gallon per acre. Do not apply more than 4 times per season nor within 7 days of harvest. Do not use vines for feed or forage nor pasture treated areas.
	Leaf miners Stink bugs	1-1/2 to 2	
Cucumbers	Spotted cucumber beetle Striped cucumber beetle Western-striped cucumber beetle	2	Apply specified dosage per acre by air or ground equipment in sufficient water for complete coverage but not less than 1 gallon per acre. Do not apply more than 3 times per season nor within 1 day of harvest.
Eggplant	Leaf miners	1-1/2 to 2	Apply specified dosage per acre by air or ground equipment in sufficient water to give complete coverage but not less than 1 gallon per acre. Repeat as necessary. Do not apply after fruit set.
	European corn borer Flea beetles	2	
Onions (Green & Dry)	Thrips	2 to 3	Apply specified dosage per acre by air or ground equipment in sufficient water to give complete coverage but not less than 1 gallon per acre. Do not apply more than 3 times per season nor within 28 days of harvest of dry onions or 7 days of harvest of green onions.
Peppers	Leaf miners	1-1/2 to 2	Apply specified dosage per acre by air or ground equipment in sufficient water to give complete coverage but not less than 1 gallon per acre. A maximum of 4 treatments may be made up to within 3 days of harvest. Where more than 4 applications are required, do not apply last spray within 14 days of harvest.
	European corn borer Flea beetles	2	
Potatoes	Colorado potato beetle	1-1/2	Apply specified dosage per acre by air or ground equipment in sufficient water for complete coverage but not less than 1 gallon per acre. Repeat as necessary. Do not apply within 7 days of harvest.
	Banded cucumber beetle Leaf miners	1-1/2 to 2	
	European corn borer Flea beetle Leafhoppers Spittlebugs Tarnished plant bug	2 to 3	
	Tuberworm	2-1/4 to 3	

RECOMMENDED APPLICATIONS (Continued)

CROP	INSECT	Pints GUTHION 2S	REMARKS
VEGETABLES (Cont.)			
Spinach	Aphids Leaf miners Mites	1-1/2 to 2	Apply specified dosage per acre by air or ground equipment in sufficient water for complete coverage but not less than 1 gallon per acre. Repeat as necessary. Do not apply within 14 days of harvest.
Tomatoes	Colorado potato beetle	1-1/2	Apply specified dosage per acre by air or ground equipment in sufficient water for complete coverage but not less than 1 gallon per acre. Repeat as necessary. The high rates should be used where heavy infestations of late instar lepidopterous larvae (large worms) and pinworms are present. Rates of 3 pints or less per acre may be applied up to day of harvest. Rates above 3 pints per acre require an interval of 14 days between application and harvest.
	Banded cucumber beetle Drosophila Green stink bug Leaf miners Whitefly	1-1/2 to 2	
	Aphids European corn borer Flea beetles Grasshoppers Leafhoppers Thrips	2 to 3	
	Tuberworm	2-1/4 to 3	
	Corn earworm Fruitworm Hornworm Pinworm Yellow-striped armyworm	3 to 6	
MELONS	Leafhoppers Leaf miners	1-1/2 to 2	Apply specified dosage per acre by air or ground equipment in sufficient water to give complete coverage but not less than 1 gallon per acre. Repeat as necessary up to the day of harvest but not more than 4 times per season.
Honeydew Melons Muskmelons (Cantaloupe) Watermelons Other melons	Rindworms Spotted cucumber beetle Striped cucumber beetle Western-striped cucumber beetle	2	
ORNAMENTALS	Aphids Cerococcus scale Euonymus scale Juniper scale Lace bugs Leafhoppers Mites Olive scale Oystershell scale Pulvinaria scale Thrips	1-1/2 to 2	Apply specified dosage per 100 gallons of water (2 teaspoonfuls per gallon). Spray all foliage surfaces including the underside of leaves for complete coverage. For control of black pine leaf, brown soft, European elm, and Putnam scales, use 1 tablespoonful per gallon. Repeat as necessary.
Ornamentals Nursery Plants, Forest & Shade Trees	Brown soft scale Putnam scale	4	
	European elm scale Black pine leaf scale	3 to 4	

RECOMMENDED APPLICATIONS (Continued)

CROP	INSECT	Pints GUTHION 2S	REMARKS
ORNAMENTALS (Cont.)			
Ornamentals, Nursery Plants, Forest & Shade Trees (Cont.)	Cone midge Cone moth	8 to 16	Apply specified dosage per 100 gallons of water. Time applications to coincide with moth flight when cones are open for pollination. Thorough coverage of cones is necessary for maximum control. Repeat as necessary.
	European pine shoot moth Nantucket pine tip moth	1-1/2 to 3	Apply specified dosage per acre in sufficient water for good coverage. Time applications to coincide with moth flights. For application to individual trees, use 1 tablespoonful of GUTHION 2S per gallon of water.
	Injury to hawthorn or American linden may occur under some conditions. Do not allow children or pets on treated area until material has been washed into soil and treated area is dry.		
Southern Pine Seed Orchards	Coneworm Seedworm	See Remarks	Use 6 pints per 100 gallons of water (0.2% dilution) for high volume sprayers or 3 pints per 10 gallons (30 of water (1% dilution) for low volume sprayers. Apply first application within 30 days following conelet closure, followed by 3 to 5 applications (at least 30 days apart). Apply approximately 5 to 10 gallons of the 0.2% dilution with high volume sprayers or approximately 1 to 2 gallons of the 1% dilution with low volume sprayers per tree. Thorough coverage of cones is necessary for maximum control.

*This concentration is calculated for conventional hydraulic-type sprayers. When lower volumes of spray are applied per acre with concentrate sprayers, increase the concentration of GUTHION 2S in the spray mixture in order to apply amount of GUTHION 2S per acre equivalent to a full coverage spray. Where conditions dictate an air application, apply dosage per acre equivalent to a full coverage ground spray in not less than one gallon of water per acre.

(1) NOTE: This formulation, when used undiluted, may cause spotting of automobile finishes if prolonged exposure is permitted. Do not spray directly over automobiles. If accidental exposure does occur, automobiles should be washed immediately.

RESTRICTIONS

Do not use on other crops used for food or forage. Use only according to label directions. Application at rates above those shown may result in illegal crop residues. Do not graze livestock in treated orchards or groves for 21 days after treatment. Do not treat food crops grown in the greenhouse. Do not apply when weather conditions favor drift from areas treated.

Since certain States may require specific worker re-entry periods for various crops treated with GUTHION, or re-entry periods different than those noted on this label, consult your State Regulations of your State Department of Agriculture for information.

This product is toxic to fish, birds and other wildlife. Keep out of any body of water. Do not apply where runoff is likely to occur. Do not apply when weather conditions favor drift from areas treated. Do not contaminate water by cleaning of equipment, or disposal of wastes.

Apply this product only as specified on this label.

CONTAINER DISPOSAL

DO NOT REUSE THE CONTAINER - Completely empty the contents and bury the unused chemical at least 18 inches deep in an isolated location away from water supplies. Rinse empty drum by filling with water and add 1 cup of household lye to each 5 gallons of water. Bury rinse solution at least 18 inches deep in an isolated area away from water supply. Punch holes in the top and bottom of the can, crush the can, and bury deeply in an isolated location.

Do not use container in any connection with feed, food, and drinking water.

DANGER

Poisonous if swallowed, inhaled, or absorbed through the skin. Do not get in eyes or on skin. Do not breathe fumes or spray mist. Spray operator should work to windward to stay out of drift or mist.

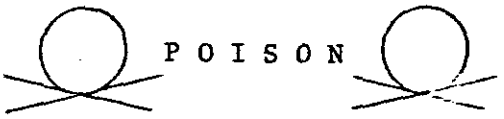
When loading spray tank or handling the concentrate at any other time, wear protective clothing, natural rubber gloves, and goggles. Wear a pesticide respirator jointly approved by the Mining Enforcement and Safety Administration (formerly the U.S. Bureau of Mines) and by the National Institute for Occupational Safety and Health under the provisions of 30 CFR Part 11.

Do not contaminate feed or foodstuffs. Keep out of reach of children and domestic animals. Keep all unprotected persons out of the operating area or vicinity where there may be danger of drift. Wash hands, arms, and face thoroughly with soap and warm water before eating or smoking. Wash all contaminated clothing with soap and hot water before reuse.

DANGER (Continued)

SYMPTOMS OF POISONING: A sense of "tightness" in the chest. Sweating. Contracted pupils. Stomach pains. Vomiting and diarrhea.

TREATMENT: In case of poisoning call a physician immediately. Have patient lie down and keep quiet. If swallowed, induce vomiting by giving a tablespoonful of salt in a glass of warm water. Administer milk or water freely and again induce vomiting until vomit fluid is clear. If on skin, remove contaminated clothing and wash skin immediately with soap and warm water. If eyes are contaminated, wash with flowing water for at least 15 minutes.



TO PHYSICIAN:

ANTIDOTE - Administer atropine sulfate in large therapeutic doses. Repeat as necessary to the point of tolerance. 2-PAM is also antidotal and may be administered in conjunction with atropine.

Compound inhibits cholinesterase resulting in stimulation of the central nervous system, the parasympathetic nervous system, and the somatic motor nerves. Do not give morphine. Watch for pulmonary edema, which may develop in serious cases of poisoning even after 12 hours. At first sign of pulmonary edema, the patient should be placed in an oxygen tent and treated symptomatically.

GUTHION is a Reg. TM of the Parent Company of Farbenfabriken Bayer GmbH, Leverkusen.

C-816532

Base Reg. (2600)

U.S. LABEL

Reason to Issue: To revise "Conditions of Sale".

Date of Draft: 1/12/77 (S)
Supersedes Draft Dated: 1/9/76

EPA Reg. No. 3125-102

(R)
GUTHION 2L

EMULSIFIABLE INSECTICIDE

FOR EFFECTIVE ECONOMICAL INSECT CONTROL

Contains 2 lbs. O,O-Dimethyl S-[(4-oxo-1,2,3-benzotriazin-3(4H)-yl)methyl] phosphorodithioate per gallon.

NET CONTENTS GALLONS

POISON

DANGER

KEEP OUT OF REACH OF CHILDREN

(See rear panel for antidote and danger statements)

ACTIVE INGREDIENTS:	
O,O-Dimethyl S-[(4-oxo-1,2,3-benzotriazin-3(4H)-yl)methyl] phosphorodithioate	22.2%
Aromatic Petroleum Distillate	67.8%
INERT INGREDIENTS:	10.0%
	100.0%

EPA Reg. No. 3125-102

STOP - READ THE LABEL BEFORE USE

DO NOT STORE BELOW 55° F.

PROTECT FROM HEAT KEEP AWAY FROM OPEN FLAME DO NOT HEAT

CHEMAGRO AGRICULTURAL DIVISION
MOBAY CHEMICAL CORPORATION
Box 4913, Kansas City, Missouri 64120

Note: Underlined letters in chemical nomenclature should be italicized when printed, not underlined.

DIRECTIONS FOR USE

IMPORTANT: Read these entire Directions and Conditions of Sale before using GUTHION 2L emulsifiable insecticide.

CONDITIONS OF SALE: THE DIRECTIONS ON THIS LABEL WERE DETERMINED THROUGH RESEARCH TO BE THE DIRECTIONS FOR CORRECT USE OF THIS PRODUCT. THIS PRODUCT HAS BEEN TESTED FOR A RANGE OF WEATHER CONDITIONS SIMILAR TO THOSE WEATHER CONDITIONS THAT ARE ORDINARY AND CUSTOMARY IN THE GEOGRAPHIC AREA WHERE THE PRODUCT IS USED. INSUFFICIENT CONTROL OF PESTS MAY RESULT FROM THE OCCURRENCE OF EXTRAORDINARY OR UNUSUAL WEATHER, OR FROM FAILURE TO FOLLOW LABEL DIRECTIONS. IN ADDITION, FAILURE TO FOLLOW LABEL DIRECTIONS MAY CAUSE INJURY TO THE CROP TO WHICH THE PRODUCT IS APPLIED, OTHER CROPS, ANIMALS, MAN, OR THE ENVIRONMENT. CHEMAGRO AND THE SELLER OFFER, AND THE BUYER ACCEPTS AND USES, THIS PRODUCT SUBJECT TO THE CONDITIONS THAT EXTRAORDINARY OR UNUSUAL WEATHER OR FAILURE TO FOLLOW LABEL DIRECTIONS ARE BEYOND THE CONTROL OF CHEMAGRO AND ARE, THEREFORE, THE RESPONSIBILITY OF THE BUYER.

MIXING: GUTHION 2L emulsifiable insecticide forms an emulsion when diluted with water and is suitable for use in all power-operated ground sprayers and aircraft sprayers. To mix with water, pour the required amount of GUTHION 2L into full amount of water and then agitate. GUTHION 2L may also be applied undiluted as an ultra-low volume spray with either ground or aircraft equipment that has been adapted and calibrated for ultra-low volume spraying as described below under "Recommended Applications" for those crops specified.

'SAGE: Use specified dosage of GUTHION 2L in the amount of water necessary to give complete coverage of foliage. The type of equipment used will determine the concentration required.

SPRAYING: Work to windward. Protect sprayer operators from drift or mist. When low volumes of spray are applied, complete coverage and thorough application are essential for most effective results. Schedule applications in accordance with local conditions. Consult your State Agricultural Extension Service or Experiment Station for specific use information in your area.

RECOMMENDED APPLICATIONS

CROP	INSECT	Pints GUTHION 2L	REMARKS
FIELD CROPS			Apply specified dosage per acre using a minimum of 10 gallons of water per acre when applying with ground equipment, and a minimum of 5 gallons per acre for aerial applications for alfalfa weevils and at least 1 gallon per acre for the other insects listed. It may be necessary to use 20 to 25 gallons of water per acre on heavy growth for control of alfalfa weevil or Egyptian alfalfa weevil with ground equipment. (REMARKS CONTINUED ON PAGE 3.)
Alfalfa Clover	Alfalfa weevil	1 to 3	
	Leafhoppers Mites	1 to 2	
	Egyptian alfalfa weevil	1-1/2 to 3	
	Alfalfa plant bug Fleahopper Grasshoppers Lygus bugs Spittlebug	2 to 3	

RECOMMENDED APPLICATIONS
(Continued)

CROP	INSECT	Pints GUTHION 2L	REMARKS
FIELD CROPS (Cont'd)			(CONTINUED FROM PAGE 2)
Alfalfa Clover	Alfalfa weevil	1 to 3	Apply twice per cutting at the 1 pint rate at intervals of 10 to 11 days. Do not apply more than twice per cutting at the 1 pint rate. Apply only once per cutting at rates above 1 pint per acre. Do not apply within 14 days of harvest at the rates of 1 to 1 1/2 pints per acre or within 16 days at the rate of 2 pints per acre. Do not apply rates above 2 pints per acre within 21 days of harvest.
	Leafhoppers Mites	1 to 2	
	Egyptian alfalfa weevil	1 1/2 to 3	
	Alfalfa plant bug Fleahopper Grasshoppers Lygus bugs Spittlebug	2 to 3	
Cotton (Conventional or Low Volume Spray)	Aphids Boll weevil Brown cotton leafworm Cotton fleahopper Cotton leafworm Lygus bugs Mites Thrips	1	Apply specified dosage per acre by air or ground equipment in at least 1 gallon of water. For early season control of bollworm and pink bollworm use 2 to 3 pints and for mid-to-late season applications use 3 to 4 pints. Repeat as necessary. Do not apply within 1 day of picking. Cotton receiving late season applications should not be pastured and gin trash from this cotton should not be fed.
	Rapid plant bug Tarnished plant bug	1 to 2	
	Stink bug	2	
	Bollworm Pink bollworm	2 to 4	
Cotton (1) (Ultra Low Volume Spray)	Boll weevil	1/2 to 1	GUTHION 2L may be used undiluted in any ground or aerial spray equipment that has been adapted and calibrated for ultra-low volume spraying. Spray machines must be equipped with accepted low volume devices that will produce droplets within the range of 30 to 100 microns in size. ULV aerial applications should be made at altitudes of 10 to 20 feet. Repeat applications as necessary but not within 2 days of hand picking. Cotton may be machine harvested anytime after application. Do not graze livestock in treated areas. Do not feed gin trash to livestock. Early and Mid-season control: Apply specified dosage per acre in accordance with local recommendations.
		1	Diapause Weevil Control: The one pint per acre rate only is recommended for control of diapausing boll weevils. Schedule applications in accordance with local recommendations.

RECOMMENDED APPLICATIONS
(Continued)

CROP	INSECT		Pints GUTHION 2L	REMARKS
FIELD CROPS (Cont'd)				Apply specified dosage per acre by air or ground equipment in sufficie water for complete coverage but not less than 1 gallon per acre. Treat for hornworms as soon as egg masses or worms are first found. Repeat as necessary but not within 6 days of harvest. Prime before treating.
Tobacco	Aphids Grasshoppers Tobacco hornworm Tobacco flea beetle		2 to 3	
	Tobacco budworm		3	
Fruit Apricots Nectarines Peaches	Aphids Cottony peach scale European fruit lecanium scale Forbes scale Lesser peach tree borer Mites Peach tree borer	Platynota flavedana leaf roller Plum curculio Red-banded leaf roller San Jose scale Stink bug Tarnished plant bug Terrapin scale Walnut scale White peach scale	1 to 1 1/4	Apply specified dosage in 100 gallons of water as a full coverage spray* using not more than 800 gallons of finished spray per acre. Repeat as necessary. Do not apply more than 8 times per season, within 21 days of harvest for apricots, nectarines, and peaches, nor within 15 days of harvest for plums and prunes. Apply the 1 1/2-pint rate for oriental fruit moth or peach twig borer on apricots, nectarines and peaches only before mid-season. For control of peach tree borer, apply 2 or 3 sprays to trunk from ground to scaffold limbs, timed with moth flight. For scale control, apply when crawlers are present. NOTE: It is suggested that when treating nectarines during bloom period, beekeepers should be warned well in advance to remove hives a safe distance from orchards to be treated.
	Oriental fruit moth Peach twig borer		1 to 1 1/2	
ectarines	Thrips		1 to 1-1/4	
Plums Prunes	Aphids Eyed-spotted bud moth Forbes scale Fruit tree leaf roller Lesser peach tree borer Mites Orange tortrix Peach tree borer	Peach twig borer Plum curculio Red-banded leaf roller San Jose scale Stink bug Tarnished plant bug Tussock moth	1 to 2	
	American plum borer		2	

RECOMMENDED APPLICATONS
(Continued)

CROP	INSECT	Pints GUTHION 2L	REMARKS
FRUIT (Cont'd)			
Blackberries Boysenberries Loganberries Raspberries	Leafhoppers Leaf rollers Leaf miners Aphids Obscure root weevil	1 1 1/4 1 1/4 to 2 2	Apply specified dosage per acre to foliage using approximately 200 gallons of water for good coverage. Where ground conditions dictate an air application of GUTHION 2L, use specified rate in a minimum of 1 gallon of water per acre. Repeat as necessary but not within 14 days of harvest.
	Raspberry crown (root) borer	4 to 8	For control of root weevils and borers prior to harvest apply specified dosage per acre to lower portion of canes and to the soil beneath the plants using approximately 200 gallons of water. Do not apply more than twice per season. Do not make applications within 3 days of harvest at rates up to 4 pints per acre. Rates above 4 pints per acre should be applied only before fruit set or after crop is harvested.
	Obscure root weevil	2	
Blueberries (Eastern & North Central States Only)	Blueberry maggot Fruitworms Lecanium Scale Plum curculio	2 to 3	Apply specified dosage per acre using approximately 200 gallons of water for good coverage. Where ground conditions dictate an air application of GUTHION 2L use specified rate in a minimum of 1 gallon of water per acre. Repeat as necessary but not more than 4 times per season nor within 3 days of harvest. If multiple late season applications of dust formulations containing GUTHION are to be made for blueberry maggot control, then do not make more than two spray applications of GUTHION 2L per season with the last spray no later than June 15.

RECOMMENDED APPLICATIONS
(Continued)

CROP	INSECT	Pints GUTHION 2L	REMARKS
FRUIT (Cont'd) Cranberries	Cranberry fruitworm Sparganothis sulfureana Tipworm	2 to 4	Apply specified dosage per acre using approximately 200 gallons of water for good coverage. Where ground conditions dictate an air application of GUTHION 2L use specified rate in a minimum of 1 gallon of water per acre. Repeat as necessary. Do not apply within 21 days of harvest.
	Fireworms	4	
Cherries	Eye-spotted bud moth Forbes scale Fruit flies Fruit tree leaf roller Lesser peach tree borer Mites Plum curculio San Jose scale	1 to 2	Apply specified dosage in 100 gallons of water as a full coverage spray* using not more than 800 gallons of finished spray per acre. Repeat as necessary. Do not apply more than 8 times per season nor within 15 days of harvest.
	Cherry leaf miner Mineola moth	1	
Citrus Fruits	Aphids Black scale Brown soft scale Chaff scale Citricola scale Citrus mealybug Citrus rust mite Citrus thrips Cottony-cushion scale European brown snail Florida red scale Fruit tree leaf rollers Fuller rose beetle Glover scale Orange tortrix Purple scale Snow scale Western tussock moth Whiteflies	1 to 1 1/2	Apply specified dosage in 100 gallons of water as a full coverage spray* using not more than 2000 gallons of finished spray per acre. A single application per year may be applied up to within 7 days of picking. Where 2 applications are required, the second spray should not be applied within 28 days of harvest. Do not apply more than twice per fruit year. Do not pick fruit or do other work involving contact with the tree, such as pruning, within 7 days of treatment.
	California red scale Texas citrus mite Yellow scale	1 1/2	

RECOMMENDED APPLICATIONS
(Continued)

CROP	INSECT	Pints GUTHION 2L	REMARKS
FRUIT (Cont'd)			
Grapes	Grape berry moth Grape cane girdlers Grape mealybug Leafhoppers Mites Red-banded leaf roller Thrips	1 to 2	Apply specified dosage in 100 gallons of water as a full coverage spray* using not more than 300 gallons of finished spray per acre. Repeat as necessary but not more than 3 times per season. Minimum dosage specified may be applied up to harvest. Higher rates up to 1 1/2 pints require a 10-day interval to harvest and above 1 1/2 pints a 28-day interval to harvest.
Straw-berries	Aphids Meadow spittlebug Oblique-banded leaf roller Omniverous leaf tier Obscure root weevil Pea leaf weevil Small black (Grass) weevil Strawberry leaf rollers Whitefly	2	Apply specified dosage in 200 gallons of water per acre as a full coverage spray*. Where ground conditions dictate an air application, use specified rate in a minimum of 1 gallon of water per acre. Repeat as necessary. Do not apply within 5 days of harvest.
NUTS			
Almonds	Peach twig borer	1 1/2 to 2	Apply specified dosage in 100 gallons of water as a full coverage spray* using not more than 500 gallons of finished spray per acre. Do not apply more than twice per season nor within 60 days of harvest. Allow 30 days between applications.
Filberts (Pacific Northwest Only)	Apple mealybug Filbert aphid Filbert leaf roller Filbertworm	1 to 3	Apply specified dosage in 100 gallons of water as a full coverage spray* using not more than 1000 gallons of finished spray per acre. Repeat as necessary. Do not apply within 30 days of harvest. Do not graze livestock in treated groves for 21 days after treatment.
Pecans	Aphids Fall webworm Hickory shuckworm Leaf miners May beetles Mites Pecan casebearer Southern green stink bug Spittlebug Twig girdlers Walnut caterpillar	1 1/2 to 2 1/4	Apply specified dosage in 100 gallons of water as a full coverage spray* usir not more than 1800 gallons of finished spray per acre. Repeat as necessary. Do not apply after husks split. Where more than 22 1/2 pints of GUTHION 2L are applied per acre in a single application do not graze livestock in treated groves. Where 22 1/2 pints or less of GUTHION 2L are applied per acre livestock may be grazed in treated groves after a 21-day post-treatment interval.

RECOMMENDED APPLICATIONS
(Continued)

/P	INSECT	Pints GUTHION 2L	REMARKS
NUTS (Cont'd)			
Walnuts	Aphids Codling moth European red mite Filbertworm	1 1/2 to 3 3/4	Apply specified dosage in 100 gallons of water as a full coverage spray* using not more than 1100 gallons of finished spray per acre. Repeat as necessary. Do not apply after husks split. Do not graze livestock in treated groves for 21 days after treatment.
VEGETABLES			
Artichokes	Plum moth	6	Apply specified dosage per acre by air or ground equipment in sufficient water for complete coverage but not less than 1 gallon per acre. Repeat as necessary. Do not apply within 30 days of harvest. Do not feed or ensile treated forage.
Beans (Snap & Dried)	Leaf rollers Mites	1 to 2	Apply specified dosage per acre by air or ground equipment in sufficient water to give complete coverage but not less than 1 gallon per acre. Repeat as necessary. Do not apply to snap beans within 7 days of harvest nor to dry beans within 30 days of harvest. Do not exceed 4 applications on dry beans. Do not feed or ensile treated forage.
	Aphids Bean leaf beetle Green cloverworm Leafhoppers Leaf miners Stink bugs Velvet bean caterpillar	1 1/2 to 2	
	Mexican bean beetle Spotted cucumber beetle Striped cucumber beetle Tarnished plant bug Western-striped cucumber beetle	2	
Broccoli Brussels Sprouts Cabbage Cauliflower	Aphids Cabbage looper Diamondback moth Imported cabbageworm	2 to 3	Apply specified dosage per acre in sufficient water for complete coverage but not less than 1 gallon per acre. Repeat as necessary. Do not apply within 7 days of harvest for Brussels sprouts, 15 days of harvest for broccoli and cauliflower, nor within 21 days of harvest for cabbage.
	Cabbage maggot	1/2	Mix specified dosage in 50 gallons of water. Apply 4 to 6 ounces of this emulsion per plant immediately after transplanting.
	Cabbage maggot (Transplant Fields in California only)	3	Apply specified dosage in 300 to 400 gallons of water per acre as a soil drench in the rows when damage first appears. Additional applications may be necessary. Do not apply within 21 days of harvest.
	Cabbage maggot (Direct Seeded Fields in California only)	3	Apply specified dosage per acre in sufficient water for uniform distribution. Mix in the upper 2 inches of soil prior to seeding or spray in the seed row at planting time. Usually 2 to 3 additional sprays are necessary during the growing season depending upon time of year and maggot population. Do not apply within 21 days of harvest.

RECOMMENDED APPLICATIONS
(Continued)

CROP	INSECT	Pints GUTHION 2L	REMARKS
VEGETABLES	(Cont'd)		
Celery	Aphids Leaf miners Leafhoppers Spittlebugs Tarnished plant bug	2	Apply specified dosage in 100 gallons of water as a full coverage spray* using not more than 200 gallons of finished spray per acre. Repeat as necessary but not within 14 days of harvest.
Blackeyed peas (Southern peas, Crowder peas)	Corn earworm Cowpea curculio	3 to 4	Apply specified dosage per acre by air or ground equipment in sufficient wate for complete coverage but not less than 1 gallon per acre. Do not apply more than 4 times per season nor within 7 days of harvest. Do not use vines for feed or forage nor pasture treated areas.
	Leaf miners Stink bugs	1 1/2 to 2	
Cucumbers	Spotted cucumber beetle Striped cucumber beetle Western-striped cucumber beetle	2	Apply specified dosage per acre by air or ground equipment in sufficient wate for complete coverage but not less tha 1 gallon per acre. Do not apply more than 3 times per season nor within 1 day of harvest.
Eggplant	Leaf miners	1 1/2 to 2	Apply specified dosage per acre by air or ground equipment in sufficient wate to give complete coverage but not less than 1 gallon per acre. Repeat as necessary. Do not apply after fruit set.
	European corn borer Flea beetles	2	
Onions (Green & Dry)	Thrips	2 to 3	Apply specified dosage per acre by air or ground equipment in sufficient wate to give complete coverage but not less than 1 gallon per acre. Do not apply more than 3 times per season nor within 28 days of harvest of dry onions or 7 days of harvest of green onions.
Peppers	Leaf miners	1 1/2 to 2	Apply specified dosage per acre by air or ground equipment in sufficient wate to give complete coverage but not less than 1 gallon per acre. A maximum of treatments may be made up to within 3 days of harvest. Where more than 4 applications are required, do not apply last spray within 14 days of harvest.
	European corn borer Flea beetles	2	
Potatoes	Colorado potato beetle	1 1/2	Apply specified dosage per acre by air or ground equipment in sufficient wate for complete coverage but not less than 1 gallon per acre. Repeat as necessary. Do not apply within 7 days of harvest.
	Banded cucumber beetle Leaf miners	1 1/2 to 2	
	European corn borer Flea beetle Leafhoppers Spittlebugs Tarnished plant bug	2 to 3	
	Tuberworm	2 1/4 to 3	

RECOMMENDED APPLICATIONS
(Continued)

CROP	INSECT	Pints GUTHION 2L	REMARKS
VEGETABLES (Cont'd)			
Spinach	Aphids Leaf miners Mites	1 1/2 to 2	Apply specified dosage per acre by air or ground equipment in sufficient water for complete coverage but not less than 1 gallon per acre. Repeat as necessary. Do not apply within 14 days of harvest.
Tomatoes	Colorado potato beetle	1 1/2	Apply specified dosage per acre by air or ground equipment in sufficient water for complete coverage but not less than 1 gallon per acre. Repeat as necessary. The high rates should be used where heavy infestations of late instar lepidopterous larvae (large worms) and pinworms are present. Rates of 3 pints per acre or less may be applied up to day of harvest. Rates above 3 pints per acre require an interval of 14 days between application and harvest.
	Banded cucumber beetle Drosophila Green stink bug Leaf miners Whitefly	1 1/2 to 2	
	Aphids European corn borer Flea beetles Grasshoppers Leafhoppers Thrips	2 to 3	
	Tuberworm	2 1/4 to 3	
	Corn earworm Fruitworm Hornworm Pinworm Yellow-striped armyworm	3 to 6	
MELONS			
Honeydew Melons	Leafhoppers Leaf miners	1 1/2 to 2	Apply specified dosage per acre by air or ground equipment in sufficient water to give complete coverage but not less than 1 gallon per acre. Repeat as necessary up to the day of harvest but not more than 4 times per season.
Muskmelons (Cantaloupe) Watermelons Other melons	Rindworms Spotted cucumber beetle Striped cucumber beetle Western-striped cucumber beetle	2	
ORNAMENTALS			
Ornamentals Nursery Plants Forest & Shade Trees	Aphids Cerococcus scale Euonymus scale Juniper scale Lace bugs Leafhoppers Mites Olive scale Oystershell scale Pulvinaria scale Thrips	1 1/2 to 2	Apply specified dosage per 100 gallons of water (2 teaspoonfuls per gallon). Spray all foliage surfaces including the underside of leaves for complete coverage. For control of black pine leaf, brown soft, European elm, and Putnam scales, use 1 tablespoonful per gallon. Repeat as necessary.
	Brown soft scale Putnam scale	4	
	European elm scale Black pine leaf scale	3 to 4	

RECOMMENDED APPLICATIONS
(Continued)

CROP	INSECT	Pints GUTHION 2L	REMARKS
ORNAMENTALS (Cont'd)			
Ornamentals, Nursery Plants, Forest & Shade Trees (Cont'd)	Cone midge Cone moth	8 to 16	Apply specified dosage per 100 gallons of water. Time applications to coincide with moth flight when cones are open for pollination. Thorough coverage of cones is necessary for maximun control. Repeat as necessary.
	European pine shoot moth Nantucket pine tip moth	1 1/2 to 3	Apply specified dosage per acre in sufficient water for good coverage. Time applications to coincide with moth flights. For application to individual trees, use 1 tablespoonful of GUTHION 2L per gallon of water.
	Injury to hawthorn or American linden may occur under some conditions. Do not allow children or pets on treated area until material has been washed into soil and treated area is dry.		
Southern Pine Seed Orchards	Coneworm Seedworm	See Remarks	Use 6 pints per 100 gallons of water (0.2% dilution) for high volume sprayers or 3 pints per 10 gallons of water (1% dilution) for low volume sprayers. Apply first application within 30 days following conelet closure, followed by 3 to 5 applications (at least 30 days apart). Apply approximately 5 to 10 gallons of the 0.2% dilution with high volume sprayers or approximately 1 to 2 gallons of the 1% dilution with low volume sprayers per tree. Thorough coverage of cones is necessary for maximum control.

*This concentration is calculated for conventional hydraulic-type sprayers. When lower volumes of spray are applied per acre with concentrate sprayers, increase the concentration of GUTHION 2L in the spray mixture in order to apply amount of GUTHION 2L per acre equivalent to a full coverage spray. Where conditions dictate an air application, apply dosage per acre equivalent to a full coverage ground spray in not less than one gallon of water per acre.

RESTRICTIONS

Do not use on other crops used for food or forage. Use only according to label directions. Application at rates above those shown may result in illegal crop residues. Do not graze livestock in treated orchards or groves for 21 days after treatment. Do not treat food crops grown in the greenhouse.

Highly toxic to fish and wildlife. Do not contaminate any body of water nor apply to any area not specified on the label.

CONTAINER DISPOSAL

DO NOT REUSE THE CONTAINER - Completely empty the contents and bury the unused chemical at least 18 inches deep in an isolated location away from water supplies. Rinse empty drum by filling with water and add 1 cup of household lye to each 5 gallons of water. Bury rinse solution at least 18 inches deep in an isolated area away from water supply. Punch holes in the top and bottom of the can, crush the can, and bury deeply in an isolated location.

Do not use container in any connection with feed, food, and drinking water.

DANGER

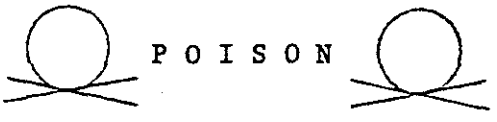
Poisonous if swallowed, inhaled, or absorbed through the skin. Do not get in eyes or on skin. Do not breathe fumes or spray mist. Spray operator should work to windward to stay out of drift or mist.

When loading spray tank or handling the concentrate at any other time, wear protective clothing, natural rubber gloves, and goggles. A mask or respirator recommended by the U.S. Bureau of Mines for protection against GUTHION should also be worn when handling the concentrate.

Do not contaminate feed or foodstuffs. Keep out of reach of children and domestic animals. Keep all unprotected persons out of the operating area or vicinity where there may be danger of drift. Wash hands, arms, and face thoroughly with soap and m water before eating or smoking. Wash all contaminated clothing with soap and hot water before reuse.

SYMPTOMS OF POISONING: A sense of "tightness" in the chest. Sweating. Contacted pupils. Stomach pains. Vomiting and diarrhea.

TREATMENT: In case of poisoning call a physician immediately. Have patient lie down and keep quiet. If swallowed, induce vomiting by giving a tablespoonful of salt in a glass of warm water. Administer milk or water freely and again induce vomiting until vomit fluid is clear. If on skin, remove contaminated clothing and wash skin immediately with soap and warm water. If eyes are contaminated, wash with flowing water for at least 15 minutes.



TO PHYSICIAN:

ANTIDOTE - Administer atropine sulfate in large therapeutic doses. Repeat as necessary to the point of tolerance. 2-PAM is also antidotal and may be administered in conjunction with atropine.

Compound inhibits cholinesterase resulting in stimulation of the central nervous system, the parasympathetic nervous system, and the somatic motor nerves. Do not give morphine. Watch for pulmonary edema, which may develop in serious cases of poisoning even after 12 hours. At first sign of pulmonary edema, the patient should be placed in an oxygen tent and treated symptomatically.

GUTHION is a Reg. TM of the Parent Company of Farbenfabriken Bayer GmbH, Leverkusen.